ROUTE CONTROL SYSTEM AND ROUTE CONTROL METHOD IN ATM SWITCHING APPARATUS

Background of the Invention

1. Field of the Invention

The present invention relates to a route monitor control system which monitors an ATM (Asynchronous Transfer Mode) switching apparatus, and a route monitor control method.

2. Description of the Related Art

In recent years, a variety of services supported by an ATM switching apparatus are required in rapid spreading of a market of the ATM switching apparatus. Therefore, various types of hardware is installed into the ATM switching apparatus to provide the variety of services and a service function of each type of hardware is extended.

On the other hand, in the quality verification of these hardware functions, after a maintenance person recognizes a kind of hardware to be verified, a maintenance command is given to carry out a conductiveness test between a trunk and a node by a monitoring apparatus installed in or out of the system.

However, because a managing method is different for every system in such a conventional route monitor control system, there is a problem to need professional knowledge for maintenance operation

for every system.

In conjunction with the above description, a test system of an ATM switching apparatus is disclosed in Japanese Laid Open Patent application (JP-A-Heisei 9-214498). In this reference, an ATM switching system is composed of the ATM switching apparatus, a maintenance console, and a test apparatus. A package test control section is provided in the ATM switching apparatus. When the package of a communication route unit is installed, the package test control section detects from a signal outputted the installation of the package from the package, and specifies a kind of the package.

Summary of the Invention

The present invention is accomplished in view of above problem. An object of the present invention is to provide a route monitor control system in which in a monitoring apparatus for maintenance operation, does not need professional knowledge special to the monitoring apparatus, a route monitor control method and a recording medium.

In an aspect of the present invention, a route monitor control system includes a plurality of OAM cell handlers (OCHs); a plurality of virtual path handlers (VPHs); a plurality of virtual channel handlers (VCHs); trunks; and a control unit. The

control unit issues an OAM (operation and maintenance) cell send instruction to a specific one of the plurality of OAM cell handlers, carries out a loop back control to at least one of the virtual path handler, the virtual channel handler, and the trunk, which are associated with the specific OAM cell handler, as an object unit in response to the OAM cell send instruction, and when the specific OAM cell handler sends out an OAM cell from the specific OAM cell handler to the object unit in response to the OAM cell send instruction, determines a fault position based on returning or non-returning of the OAM cell from the object unit to the specific OAM cell handler.

Here, the control unit may carry out a switching operation of a route from the virtual path handler to the trunk for fault avoidance based on the determining fault position.

Also, the plurality of OAM cell handlers, the plurality of virtual path handlers, the plurality of virtual channel handlers, the trunks, and the control unit may be contained in an ATM (asynchronous transfer mode) switching apparatus.

Also, it is desirable that the control unit periodically issues the OAM cell send instruction to the specific OAM cell handler.

Also, the control unit may carry out the loop back control to all of the virtual path handler (VPH),

the virtual channel handler (VCH), and the trunk, which are associated with the specific OAM cell handler, as the object units in response to the OAM cell send instruction, and when the specific OAM cell handler sends out the OAM cells to the object units in response to the OAM cell send instruction, may determine the fault position based on returning or non-returning of each of the OAM cells from the object unit to the specific OAM cell handler.

Also, the control unit may carry out the issuing operation, the loop back control and the determining operation while changing the specific OAM cell handler among the plurality of OAM cell handlers.

In another aspect of the present invention, a route monitor control method is attained: by (a) issuing an OAM (operation and maintenance) cell send instruction to a specific one of a plurality of OAM cell handlers (OCHs); by (b) carrying out a loop back control to at least one of a virtual path handler (VPH), a virtual channel handler (VCH), and a trunk, which are associated with the specific OAM cell handler, as an object unit in response to the OAM cell send instruction; by (c) sending out an OAM cell from the specific OAM cell handler to the object unit in response to the OAM cell send instruction; and by (d) determining a fault position based on returning or non-returning of the OAM cell from the object unit to

the specific OAM cell handler.

Also, the route monitor control method may further include the step of: carrying out a route switching operation for fault avoidance based on the determining fault position.

Also, the object unit is contained in an ATM (asynchronous transfer mode) switching apparatus.

Also, the virtual path handler (VPH), the virtual channel handler (VCH), and the trunk, and the specific OAM cell handler are contained in an ATM (asynchronous transfer mode) switching apparatus.

Also, the (a) issuing step may be attained by periodically issuing the OAM cell send instruction to the specific OAM cell handler.

Also, the loop back control is carried out to all of the virtual path handler (VPH), the virtual channel handler (VCH), and the trunk as the object units in response to the OAM cell send instruction, and the OAM cells may be sent out from the specific OAM cell handler to the object units in response to the OAM cell send instruction.

Brief Description of the Drawings

Fig. 1 is a block diagram showing the structure of a route monitor control system of the present invention.

Description of the Preferred Embodiments

Hereinafter, a route monitor control system in an ATM switching apparatus of the present invention will be described below with reference to the attached drawings.

Fig. 1 is a block diagram showing the structure of the route monitor control system according to an embodiment of the present invention. As shown in Fig. 1, the route monitor control system in the embodiment is composed of a plurality of virtual path handler (VPHs) 1, a plurality of virtual channel handlers (VCHs) 2, a plurality of trunks 3, a plurality of OAM cell handlers (OCHs) 4 and a control unit 5. Also, the virtual path handlers (VPHs) 1, the virtual channel handlers (VCHs) 2, the trunks 3, the OAM cell handlers (OCHs) 4 and the control unit 5 are provided in an ATM switching apparatus.

The virtual path handler (VPH) 1 relays a virtual path (VP). The virtual channel handler (VCH) 2 relays a virtual channel (VC). The trunk 3 is a unit for the termination of the VC. The OAM cell handler (OCH) 4 processes a F4 flow and a F5 flow in an ATM layer, and is a monitor which carries out a loop back test to the virtual path handler (VPH) 1, the virtual channel handler (VCH) 2, and the trunk 3, which are associated with the OAM cell handler 4, and sends out OAM cells to them. Thus, the monitor of the

sent OAM cells is carried out. The control unit 5 controls the virtual path handlers (VPHs) 1, the virtual channel handlers (VCHs) 2, the trunks 3 and the OAM cell handlers (OCHs) 4. Also, the control unit 5 issues an instruction to a specific one of the OAM cell handlers (OCHs) 4 which is provided at a predetermined position. As a result, the specific OAM cell handler (OCH) 4 operates as a starting point of the OAM cell sending-out, and receives the OAM cell returned to the specific OAM cell handler 4 through a loop route. Thus, a fault route in the ATM switching apparatus can be determined, and the control unit 5 carries out a switching control in the route based on the reception or non-reception of the returned OAM cell. In this way, in the loop back test, an OAM cell is sent out along a predetermined route, and the route is checked based on the reception or non-reception of the sent out OAM cell.

Next, an operation of the route monitor control system of the present invention will be described below with reference to Fig. 1.

First, the control unit 5 instructs a specific OAM cell handler (OCH) 4 of a plurality of OAM cell handler (OCHs) 4 to send out an OAM cell. Also, the control unit 5 controls the specific OAM cell handler (OCH) 4 to carry out a loop back control to the virtual path handler (VPH) 1, the virtual

channel handler (VCH) 2 and the trunk 3, which are associated with the specific OAM cell handler (OCH) 4, as a monitoring object.

Next, the specific OAM cell handler (OCH) 4 periodically transmits OAM cells to the virtual path handler (VPH) 1, the virtual channel handler (VCH) 2 and the trunk 3, in response to the instruction to monitor that the OAM cells are sent back to the specific OAM cell handler (OCH) 4 through loops. The specific OAM cell handler (OCH) 4 notifies the monitoring result to the control unit 5.

Lastly, the control unit 5 specifies or determines a fault portion based on the monitoring result notified from the specific OAM cell handler (OCH) 4 and carries out a fault avoidance control such as the switching of a route in the ATM switching apparatus.

In the route monitor control system of the described present invention, an OAM cell handler (OCH) 4 is specified as a starting point sending out OAM cell. However, the control unit 5 operates in such a manner that a plurality of OAM cell handler (OCHs) 4 may operate as the starting points sending out OAM cells at a time or sequentially. That is, by setting a plurality of starting points for monitoring the routes of the ATM switching apparatus, the load to monitor the ATM switching apparatus can be distributed.

Also, the OAM cell handler (OCH) 4 may be not an independent unit and may be incorporated into the virtual path handler (VPH) 1, the virtual channel handler (VCH) 2, or the trunk 3.

Moreover, the trunk 3 may be TE (Terminal Equipment) as the unit which carries out the relay of VC.

As described above, according to the route monitor control system of the present invention, the OAM cell in the ATM is loop-backed in the ATM switching apparatus as a monitoring object. Therefore, the existing ATM technique can be used for the monitor control in the ATM switching apparatus. Therefore, without needing the knowledge special to the monitor control of the ATM switching apparatus, it is possible to simply carry out a maintenance operation of the monitor control.